

# Northumbria Research Link

Citation: Perán, Macarena, Hooper, Helen, Marchal, Juan A., Boulaiz, Houria, Rodríguez-Serrano, Fernandez, Velez, Celia, Aránega, Antonia and Salas, Ramiro (2009) Cell surface immobilization of GABAARs in cerebellar granule cells depends on the M3/M4 cytoplasmatic loop of the alpha 1 subunit. *Cells, Tissues, Organs*, 189 (6). pp. 420-424. ISSN 1422-6405

Published by: Karger

URL: <http://dx.doi.org/10.1159/000159369> <<http://dx.doi.org/10.1159/000159369>>

This version was downloaded from Northumbria Research Link:  
<http://nrl.northumbria.ac.uk/id/eprint/2849/>

Northumbria University has developed Northumbria Research Link (NRL) to enable users to access the University's research output. Copyright © and moral rights for items on NRL are retained by the individual author(s) and/or other copyright owners. Single copies of full items can be reproduced, displayed or performed, and given to third parties in any format or medium for personal research or study, educational, or not-for-profit purposes without prior permission or charge, provided the authors, title and full bibliographic details are given, as well as a hyperlink and/or URL to the original metadata page. The content must not be changed in any way. Full items must not be sold commercially in any format or medium without formal permission of the copyright holder. The full policy is available online: <http://nrl.northumbria.ac.uk/policies.html>

This document may differ from the final, published version of the research and has been made available online in accordance with publisher policies. To read and/or cite from the published version of the research, please visit the publisher's website (a subscription may be required.)

# Cell Surface Immobilization of GABA<sub>A</sub>Rs in Cerebellar Granule Cells Depends on the M3/M4 Cytoplasmatic Loop of the Alpha 1 Subunit

Macarena Perán<sup>a, c</sup>, Helen Hooper<sup>d</sup>, Juan A. Marchal<sup>b, c</sup>, Houria Boulaiz<sup>b, c</sup>, Fernando Rodríguez-Serrano<sup>a, c</sup>, Celia Velez<sup>a, c</sup>, Antonia Aránega<sup>b, c</sup>, Ramiro Salas<sup>e</sup>

<sup>a</sup>Department of Health Sciences, University of Jaén, Jaén,

<sup>b</sup>Department of Anatomy and Human Embryology, University of Granada and

<sup>c</sup>Biopathology and Regenerative Medicine Institute, Granada, Spain;

<sup>d</sup>School of Applied and Molecular Sciences, University of Northumbria at Newcastle, Newcastle, UK;

<sup>e</sup>Department of Neuroscience, Baylor College of Medicine, Houston, Tex., USA

## Abstract

$\gamma$ -Aminobutyric acid (GABA) is the major inhibitory neurotransmitter in the vertebrate brain. The localization of GABA receptors type A (GABA<sub>A</sub>Rs) at strategically located domains of the neuronal membrane is of vital importance for fast inhibitory synapse transmission efficacy. We have shown before that the lateral mobility of GABA<sub>A</sub>Rs depends on subunit composition of the complex. To study the lateral mobility of GABA<sub>A</sub>Rs in living, cultured neurons, we transfected cerebellar granule cells with either the complete  $\alpha$ 1 GABA<sub>A</sub>R subunit or with a truncation of the  $\alpha$ 1 subunit that lacks the major intracellular loop (M3/M4). We examined the location and lateral mobility of receptors containing both versions of the  $\alpha$ 1 subunit in living neurons. From fluorescence recovery after photobleaching experiments we present novel evidences that the intracellular M3/M4 loop of the  $\alpha$ 1 subunit restricts the lateral mobility of GABA<sub>A</sub>Rs when expressed in neurons. In addition, our immunocytochemical studies suggested that receptors containing the truncated subunit seem to be unable to reach synaptic localizations. Here we show for the first time that the  $\alpha$ 1 intracellular loop (M3/M4) domain has a relevant role in controlling the lateral mobility of GABA<sub>A</sub>Rs in neurons, and we believe that this is a novel and important contribution in neurobiology of GABA<sub>A</sub> receptors.